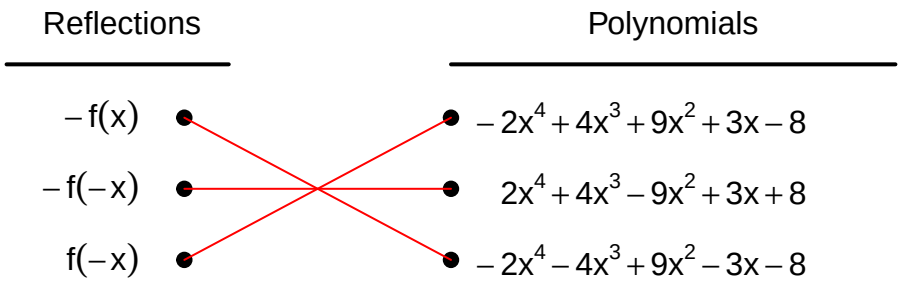
Name: Date:

Exam: Function Reflections (Solution version 21)

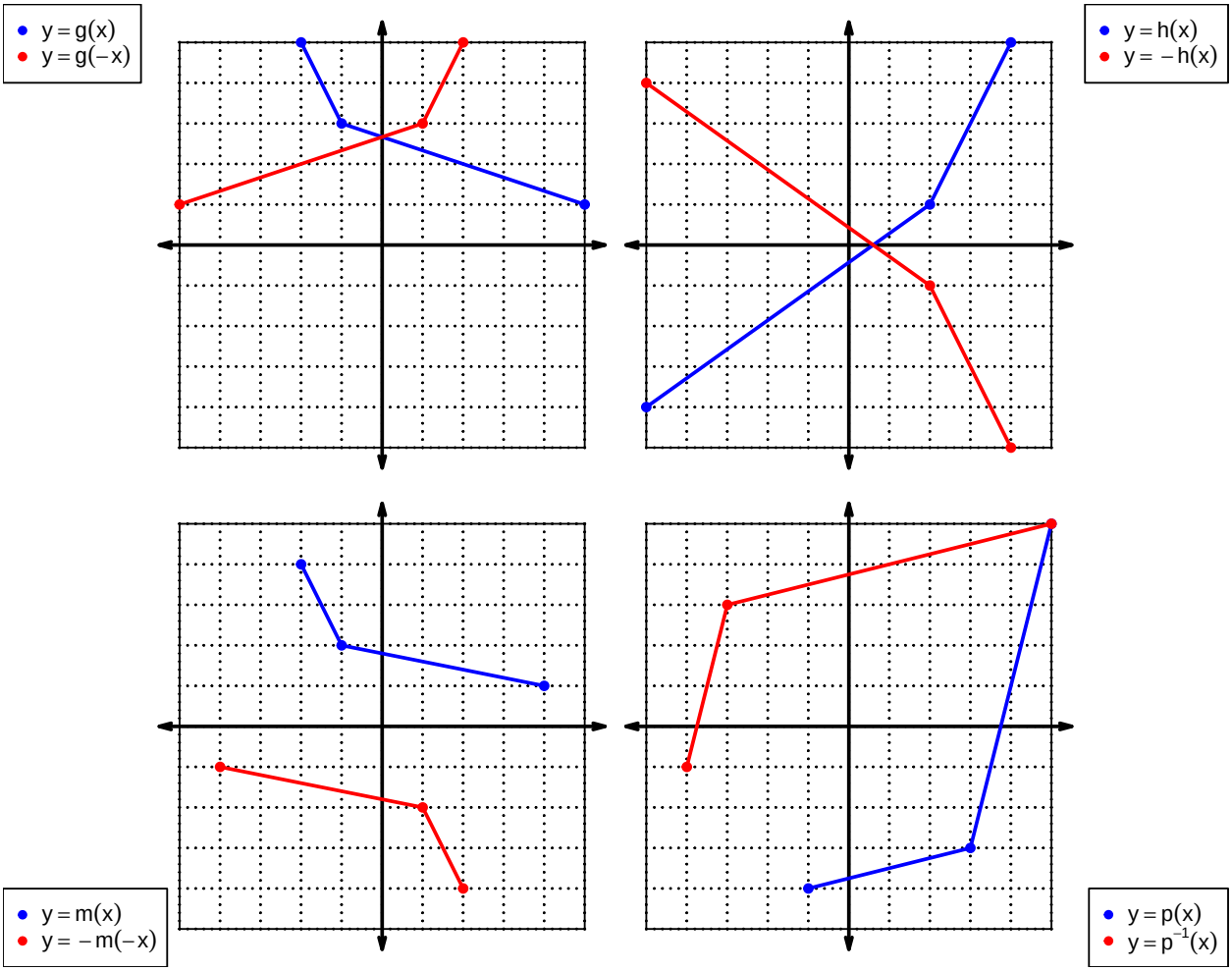
1. Let function f be defined by the polynomial below:

$$f(x) = 2x^4 - 4x^3 - 9x^2 - 3x + 8$$

Draw lines that match each function reflection with its polynomial:



2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	6	2	9
2	9	8	3
3	1	5	7
4	3	9	8
5	8	1	1
6	4	3	5
7	5	4	2
8	2	7	6
9	7	6	4

3. Evaluate $g(3)$.

$$g(3) = 5$$

4. Evaluate $h^{-1}(2)$.

$$h^{-1}(2) = 7$$

5. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-9)$?

If function h is odd, then

$$h(-9) = -4$$

6. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-1)$?

If function f is even, then

$$f(-1) = 6$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) = -x^3 + x$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^3 + (-x)$$
$$p(-x) = x^3 - x$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(x^3 - x\right)$$
$$-p(-x) = -x^3 + x$$

   c. Is polynomial p even, odd, or neither?

   odd

   d. Explain how you know the answer to part c.

   We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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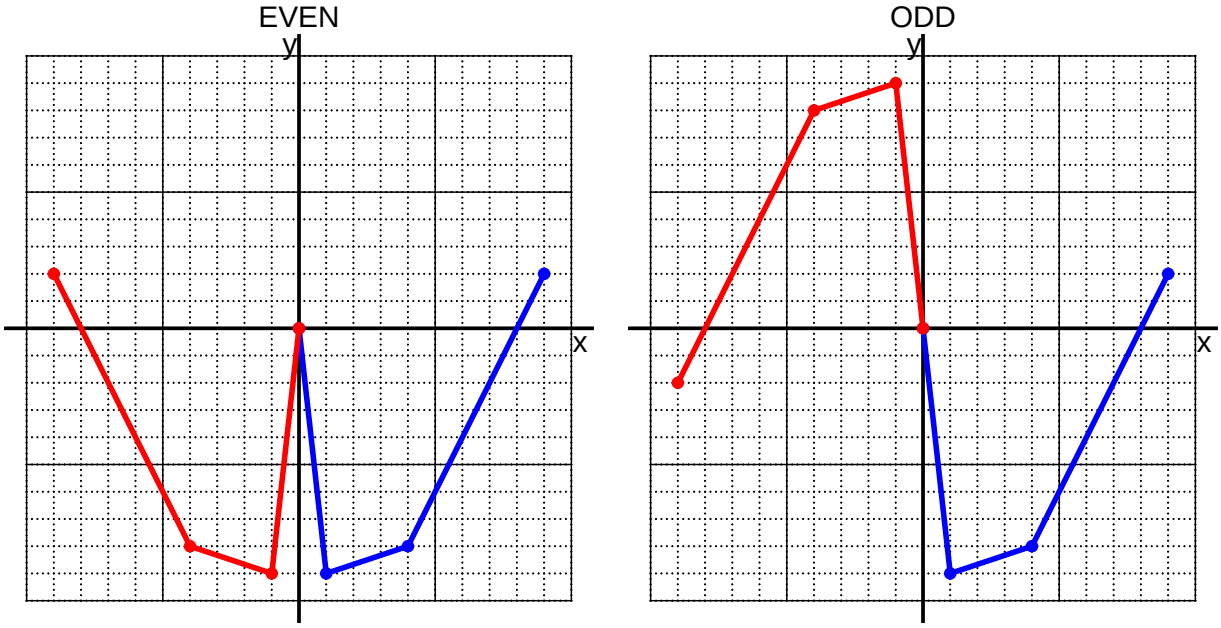
8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 4(x-5)$$

a. Evaluate $f(21)$.

step 1: subtract 5
step 2: multiply by 4

$$f(21) = 4((21)-5)$$
$$f(21) = 64$$

b. Evaluate $f^{-1}(68)$.

step 1: divide by 4
step 2: add 5

$$f^{-1}(x) = \frac{x}{4} + 5$$
$$f^{-1}(68) = \frac{(68)}{4} + 5$$
$$f^{-1}(68) = 22$$

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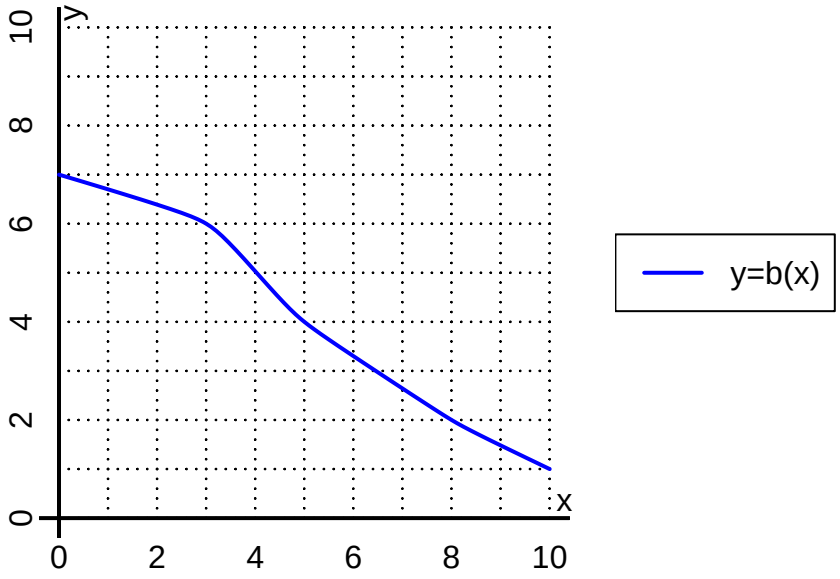
10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(8)$.

$b(8) = 2$

b. Evaluate $b^{-1}(4)$.

$b^{-1}(4) = 5$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-3	3	-3	3
-1	-6	6	6	-6
0	0	0	0	0
1	6	-6	-6	6
2	-3	3	-3	3

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.